

**ABSTRACT**

A multiple mode sensing system is described, which can be  
5 configured from an acoustic wave sensor that includes a plurality of sensing  
components for monitoring a chemical species. The plurality of sensing  
components can be disposed within a cavity formed from a plurality of walls  
of said acoustic wave sensor, such that each sensing component is coated  
with a differing sensing film. The multiple modes sensing system also  
10 includes a plurality of oscillators associated with sensing components,  
wherein each sensing component is generally located in a feedback loop  
with identical oscillators to thereby provide a multiple modes acoustic wave  
sensor that provides multiple modes frequency outputs for the detection and  
desorption of a chemical species.